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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,418	07/23/2003	Tomohei Sugiyama	5000-5118	9860
27123	7590	03/03/2006	EXAMINER	
MORGAN & FINNEGAN, L.L.P. 3 WORLD FINANCIAL CENTER NEW YORK, NY 10281-2101			MENZ, DOUGLAS M	
			ART UNIT	PAPER NUMBER
			2891	

DATE MAILED: 03/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

24

Office Action Summary	Application No.	Applicant(s)	
	10/626,418	SUGIYAMA ET AL.	
	Examiner	Art Unit	
	Douglas M. Menz	2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 1-10, 13 and 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11 and 12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

The corrected drawings were received on 12/21/05. These drawings are acceptable.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Girrens et al. (US 6154364) in view of Jackson et al. (US 5006417) and Yamagata et al. (US 6507105).

Regarding claim 11, Girrens discloses a semiconductor device comprising:

A circuit board (Fig. 2);

A heat spreader (14, Figs. 1-2) which is formed of a low expansion material and is joined to the top face of the circuit board (Fig. 2 and Col. 3, lines: 9-30); and

A semiconductor element (12, Figs. 1-2) mounted onto the heat spreader (14, Figs. 1-2 and Col. 3, lines: 9-20).

Girrens further discloses that the heat spreader (14) can be made of various materials, wherein INVAR is preferred (Col. 3, lines: 24-30). Girren does not disclose wherein the heat spreader comprises two or more kinds of SiC particles having different grain sizes and an Al material.

Jackson discloses a ternary metal matrix composite comprising SiC particles and an Al material (ABSTRACT and Col. 2, lines: 30-45). Jackson discloses that such a composite is suitable for electronic substrates, chip submounts, **heat sinks** and microcircuit subpackages among others (Col. 1, lines: 49-56). Jackson further discloses that the composite is advantageously used in place of INVAR because INVAR is a poor thermal conductor (Col. 2, lines: 5-8), wherein Jackson's composite is a good thermal conductor (Col. 24-31). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use Jackson's composite instead of INVAR for

Girren's heat spreader since Jackson explicitly discloses the advantages of using the composite over INVAR, i.e. better heat conductivity. Furthermore, Jackson discloses that the coefficient of thermal expansion of the composite can be tailored to meet specific needs (Col. 2, lines: 26-30), which is an additional advantage.

Jackson does not explicitly disclose the grain size specifics of the SiC particles. However, it is known in the art that the SiC powders used for such compositions are either classified by a statistical mean of their grain sizes or completely random relevant to their grain sizes, both of which read on the limitation "two or more kinds of SiC particles having different grain sizes." To illustrate such: Yamagata discloses an aluminum-silicon-carbide based composite for heat dissipation in semiconductor devices, wherein the SiC powder has a mean grain size of 50um (Col. 12, lines: 55-68). That is, two or more kinds of SiC particles having different grain sizes such that their mean grain size is 50um. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use SiC particles having different grain sizes in the aluminum-silicon-carbide based composite for heat dissipation in semiconductor devices.

Regarding claim 12, Girrens further discloses wherein the circuit board is composed of a metal substrate (10, Fig. 2 and Col. 3, lines: 14-16) with an insulating layer and a wiring layer formed on its surface in order (Fig. 2, *The examiner interprets the lines and squares on the circuit board to be symbolic of wires and associated bond pads that cover the top of the substrate 10, respectively. Given that the substrate 10 is*

Art Unit: 2891

stainless steel (Col. 3, lines: 14-16) it would be inherent that an insulating layer separate the wiring layer from the metal substrate, otherwise it would be rendered inoperable.);

Girrens further discloses wherein the heat spreader (14, Figs. 1-2) being joined to the top face of the wiring layer through solder (Col. 3, lines: 15-20),

And the semiconductor element (12, Figs. 1-2) being joined to the top face of the heat spreader (14, Figs. 1-2) through solder (Col. 3, lines: 15-20).

Response to Arguments

Applicant's arguments filed 12/21/05 have been fully considered but they are not persuasive. Applicant has amended claim 11 to include a **very broad** limitation pertaining to two or more kinds of SiC particles having different grain sizes and argues that Girrens in combination with Jackson do not disclose such features. This new limitation was addressed, as noted above, with the teachings of Yamagata as an example.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

Art Unit: 2891


TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas M. Menz whose telephone number is 571-272-1877. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DM


CHRISTIAN D. WILSON
PRIMARY EXAMINER